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THE West American Scientist.

A popular monthly review and record for the Pacific Coast.
Official Organ of the San Diego Society of Natural History.

C. R. ORCUTT, - - EDITOR.

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THE WEST AMERICAN SCIENTIST.

VOL. VI. SEPTEMBER, 1889. No. 47

THE CALIFORNIA GEYSERS.

The remarkable hot springs, which are commonly called by the above name, are situated in the north-easterly part of Sonoma county, some twenty miles from the southern extremity of Clear lake. The writer recently visited this spot, and so greatly enjoyed both the journey and the scenery that he would fain induce hundreds of others to go and do likewise.

To reach the Geysers is not a difficult undertaking. We will suppose you are in San Francisco and that you come to the ferry at half-past seven in the morning. Step on board the large ferry-boat "Tiburon," take a comfortable seat on the upper deck, and in a few moments the journey will begin. The whistle blows, the wheels revolve, the rudder directs the course of the boat to the north, and you are swiftly speeding past the city front with its crowded wharves and ware-houses and in a little time are feeling the gentle swell which comes in through the Golden Gate. On past Alcatraz, with its ramparts and its guns, and you are soon skirting along the western side of Angel Island. In a little hollow which comes down to the water's edge is the military settlement, and there may be seen barracks, officers' houses and store buildings prettily grouped around a central park, while on the side of a hill stands a little church, nestling among the oaks, and above this may be seen the white stones and crosses which mark the last resting places of soldiers who have died in the service. The whole forms a very peaceful picture, though the subject is grim and warlike.

A few minutes more brings you to Point Tiburon, where you leave the boat and take the train, and presently you are speeding along the track of the San Francisco and North Pacific railway.

The road winds among the oak-dotted knolls where it can, and plunges through the very heart of the hills where it must, until it reaches the pretty town of San Rafael. Quite a long tunnel is necessary to let you out on its northern side, and then you glide along the edge of salt marshes, with here and there a turn behind low hills, till you reach Petaluma. Some of the land which you have just passed is as rich as any in the State, as the sleek herds of cattle and heavily laden orchards plainly testify.

And now you enter the broad Sonoma valley, where level and productive fields spread out for miles on either side; you pause a moment at the county seat, Santa Rosa, a thriving city in the

midst of fertile plains, hasten past smaller towns, cross the Russian river below Healdsburgh, where it turns away to the west to seek the coast among forests of redwood, and following its western bank you come to the town of Cloverdale. You are now near the head of the valley; the green slopes of the mountains are close upon you on the west and broken hills rise to the east. You have already passed in the distance the noble Saint Helena and many lesser peaks belonging to this eastern range of mountains, but here the valley has become so narrow that you are not surprised to learn that for many years this was the terminus of the railroad. Within a year, however, it has been extended some thirty miles further to Ukiah, the county seat of Mendocino county. Should you continue your excursion to that point, you would be amply repaid, for the road winds along the bank of the river in a most romantic fashion. Now you can look down into the clear water and see startled trout,now you pass under the boughs of giant oaks, again you are in the darkness of a tunnel, and in a moment look back on a huge cliff, whose base the river has been assaulting for centuries. The valley broadens at length, and the rich fields are green with hop-vines or covered with ripened grain or set with young fruit trees. A few miles beyond the city of Ukiah the hills close in again, and you are at the source of the Russian river, while just across the divide are the brooks which flow northward and form some of the numerous branches of the Eel river, which empties into the ocean near Eureka. But this part of the journey, though interesting, is not essential to a visit to the Geysers. The stage for the springs leaves Cloverdale soon after noon, and makes the journey of eighteen miles in from three to four hours. You first cross the Russian river, and as you proceed to the hills you soon meet and ford one of its tributaries, the sulphur-tinctured Pluton. This stream comes down a great lateral valley from the eastern hills, and along the side of this valley, first on the north and then on the south, has been constructed the stage toll-road. It would be hard to find a wilder and more beautiful road in any of the valleys of California. The curves are innumerable, the precipitous descents which it barely but safely avoids are sufficient to stir the blood of the boldest, while the grand old trees, oak, maple, and laurel, are majestic and inspiring. Especially as one is coming down the valley in the cool of the morning does the view seem superb. Were there no wonders beyond to be seen, the ride up and down the Pluton gorge is well worth the moderate price which is asked. But at length you smell sulphur, and know you are near the end of your journey. The hotel is before you, a series of low but comfortable buildings in the midst of fine old trees, and on the other side of the brook you get a glimpse of columns of steam ascending from unknown sources. You are anxious to explore at once, but are advised to wait till the early morning; meanwhile you can visit the commodious

bath-house, and refresh yourself with a bath of steam, "hot from Tartarus," and a swim in a tank of lukewarm mineral water, heated in nature's own kettle.

The next morning you are up before the sun, and taking a basket of breakfast on your arm you set out to explore the mysterious canyon. At various intervals along your path are springs of cold or warm water, each one having its own peculiar taste according to the nature of the minerals which are held in solution. Sulphur compounds, soda and alum, with salts of iron and magnesium are the principal ingredients. From some of the springs the beverage is so hot that you must cool it before putting it to your lips, and in general you are satisfied to sample the water rather gingerly. The product of one spring is called "hot lemonade," and it flows forth in a copious stream from the subterranean mixing bowl. You acknowledge the "hot," but are inclined after a trial to discredit the appropriateness of the latter name. You prefer the somewhat more technical term "An acidulated solution of the double sulphate of aluminium and potassium." However some people like to drink it Hot springs and steaming banks abound over quite a large region, but the largest and most violent manifestations are found in the bed of a side canyon, which comes down from the north to Pluton river. It is a deep, V shaped gorge almost devoid of vegetation, and its steep walls are covered with masses of mineral matter, mostly of brownish yellow color, though varying in hue from white to jet black. Along the bottom tumbles a stream of hot water, which receives accessions from each new spring. Various small hot springs attract your attention as you enter the canyon, but your interest centers in the "Witches' Cauldron," about half way up the gulch. This is a basin some twenty feet square, partly filled with rocks and showing different degrees of activity on two of its sides. Next to the path, it is moderately quite, but near the bank it is in most violent commotion. A huge column of steam continually ascends from its surface somewhat obscuring the view, but as the wind shifts it a little, you get a view of the water, jumping, boiling, foaming, dashing, while from a cleft in the rocks at brief intervals spurts out a fountain of hot spray, which falls into and is mixed with the seething water below. The vastness and violence of the chemical changes which are going on underneath are nowhere shown so clearly as at this point. The points of interest are numerous; one wishes to spend hours in examining these remarkable phenomena. Here is a kind of oven opening into the hill; you listen, and from within you hear the hoarse gurgle and groan of the imprisoned steam; here it comes whizzing out from beneath a rock, reminding you of the safety-valve of a locomotive; there on the bank is a gently steaming cleft, and around the outlet are the most delicate needle-shaped crystals of sulphur arranged like frost work on a cold pane. In the water of one spring is a black, inky mud; in another are layers of rich brown,

pink, and purple, while a bright green water moss seems to thrive in the warm flow, and forms another color in the mass of brilliant tints. Here are layers of delicate, snowy crystals of Epsom salts, there are coatings of green copperas, and all about you are suggestions for a wondrously beautiful and harmonious carpet.

Farther up the hill you find cool, shady trees, where you are glad to stop and rest,and then if you are disposed you can climb the mountains and look off upon the blue waters of Clear lake. On your return to Cloverdale, you pass several bands of campers, who have pitched their tents near the river, and you commend their wisdom in selecting so romantic and attractive a spot. Deer are on the hills, trout in the streams, cool waters and shady streams abound, and the peace of nature is over all.

From a scientifiic point of view the California Geysers are of great interest. To some they suggest the heated condition of the interior of the earth, but the irresistable conclusion which comes to the mind of one who studies all the phenomena is that the heat is caused by the decomposition of immense quantities of sulphurets contained in the surrounding and underlying rocks, and that the various minerals with which the waters are charged are the results of the varied and extensive chemical changes which are constantly taking place. *Josiah Keep.*

A NEW SPECIES OF ERIOGONUM (E. FASTIGIATUM) FROM LOWER CALIFORNIA.

Eriogoneae, so prevalent on the Pacific Slope of North America as to give a peculiar feature to the vegetation of certain districts, diminish rapidly south of 32° N. Lat., being comparatively scantily represented in the northern tier of Mexican States and disappearing entirely within the tropics. Being specially adapted in their vegetative characters to a climate of winter rains and summer droughts, their southern extension is most prolonged along the line of the California coast range into the peninsula of Lower California. Here the peculiar conditions of growth bring to view a variety of interesting forms, many of which have been made known from recent explorations. Having been supplied with very complete material by Mr. C. R. Orcutt, the following addition to the list is herewith submitted.

ERIOGONUM FASTIGIATUM N. SP.

Fruticose 3-6 inches high, fastigiatly branched from near the base and *dichotomous* above, younger stems densely *lanose*; leaves crowded below, more scattered above, linear lanceolate 3-5 m m in length, loosely hairy above, densely tomentose beneath strongly revolute, tapering below into a slender petiole with a broad membranous clasping base; involucres sessile in the upper axils, or terminal on the dichtomous branches, 2 mm in height, deeply five parted with accuminate segments, united below into

a membranous tube; perianth with broadly oval segments nearly equal, with short turbinate tube; bracteoles linear-hispid shorter than the pedicels; stamens nine, anthers redish, akenes narrowly winged, embryo not seen.

A low, densely branched shrub, its slender fastigiate branches forming a flattened summit, with the remains of dead foliage below, flowers rather conspicuous, intermixed with the projecting dichotomous branches. To be placed in the virgatae section though the inflerescence is mainly reduced to a single terminal involucre. Is apparently near to E. taxifolium, Greene,Pi Honia I. 267. C. R. Orcutt, No. 1501 La Salada, Lower California, April, 1886. *C. C. Parry.*

CONTRIBUTIONS TOWARDS A LIST OF THE FAUNA AND FLORA OF WET MOUNTAIN VALLEY, COLORADO. I.

(Compiled for the Colorado Biological Association.)

In studying the problems of geographical distribution, it is especially necessary to consider the fauna and flora of any given region as a whole in order to come to sound and permanent conclusions. The forms of organic life are so intimately related, one with another, and have so important an influence in determining each others distribution and development, that a mere examination of any single group with a view to ascertaining the why and wherefore of its geographical range, is certain to present us with many apparent anomalies,which would readily be cleared up could we but know the distribution of other different but in this connection influential groups. The distribution and abundance of lepidoptera for instance, is most plainly influenced by the distribution of the plants on which the larvæ feed, and these plants are again influenced by the presence or absence of fertilizing insects and by parasitic fungi, by the browsing of animals and in endless different ways other than those of soil and climate. It is supposed that the fertilization of Yucca is dependent on a little moth Pronuba. Now a fine species of butterfly,Megathymus yuccæ,feeds in the larval stage upon the Yucca. Suppose that all the Pronubas were by some means exterminated, this would effect the Yuccas and so the Megathymus, as well as the Yucca Aphis, and many other insects—so that we may say that the distribution of Megathymus is actually dependent on that of Pronuba. And the same sort of thing can be demonstrated in endless different ways throughout organic nature.

The present series of lists will be prepared with these facts in view and it is hoped that they will form a basis for just conclusions respecting the origin and nature of the fauna and flora of this region. Though necessarily at present incomplete, they will at least offer fuller details than have been published hitherto respecting any one region in the Rocky Mountains, while every effort

will be made to add to and complete them in the course of time. The identifications have nearly all been made by able specialists and are hence as reliable as can be expected in the present somewhat chaotic state of systematic biology.

The district under consideration is about thirty miles in length and fifteen miles across at its broadest part. To the east it is bordered by the Wet Mountains and to the west by the Sangre de Cristo Range. The altitude is about 8,000 feet lower to the north and rising to over 13,000 feet on the peaks of the Sangre de Cristo. The northern portion of the valley is in Fremont county, the main portion being however in Custer county. The present papers will deal only with the Custer county portion of Wet Mountain valley (which embraces the whole of the valley proper, the northern part being really different in character) and only with altitudes below 10,000 feet, the higher altitudes properly deserving separate consideration. A full account of the topography, geology and climate of the valley may be prepared later.

LEPIDOPTERA HETEROCERA.

For identification in this group we are indepted to Messrs. Hy. Edwards, H. Strecker, Rev. G. D. Hulst and Lord Walsingham, while some Rosita records have been contributed by Mr. H. W. Nash. Many species not yet clearly identified are for the present omited.

1. Deilephila lineata, Fab., abundant up to 8,300 feet.

2. Smerinthus cerisii var. astarte, Streck., one at light, by Swift Creek. Larvæ without reasonable doubt belonging to this species, occur on Populus tremulöides. S. astarte, larva; forty-seven mill. long, apple green. Head dull, pale green, with a rather broad yellow stripe on each side of face, these stripes converging above, to the slightly bifid crown. Body vivid yellowish-green, tapering anteriorly, with numerous pale yellow points scattered somewhat thickly over its surface. In the subdorsal region these points are somewhat larger and are arranged so as to form a distinct but narrow subdorsal pale band, reaching from the second to the tenth segment. Obliquely placed above each abdominal spiracle (except the last) is a somewhat narrow, pale yellow band, the first of these bands being almost obsolete and the last widened and elongated, reaching up to the anal horn, which is about three mill. long and straight, blue at the base above, otherwise purplish inclining to pink, with a black tip. Prolegs pink, claspers green; near Short Creek, September 5, 1888.

Pupa, thirty-one mill. long, very dark brown, shiny, somewhat rugose. It is possible that this species also feeds on willow, as an empty egg-shell of a Smerinthus was found on a willow leaf at West Cliff.

3. Hepialus pulcher, grote., near Willow Creek.

4. Gnophaela vermiculata, gr. and Rob., abundant near Swift Creek. When freshly emerged, the normally white parts

of the wings are tinged with a delicate primrose yellow. The white parts of the body are not so tinged. The yellow color is probably due to the fluid within the wing-membranes.

5. Euprepia parthenos; occurs at 8,400 feet altitude.
6. Arctia blakei, grote., one specimen August 10, 1887.
7. Arctia pallida, Strecker, frequent at 8,400 feet near Short Creek.
8. Leptarctia lena, Bdv., not rare on open ground.
9. Alypia lorquini, Rosita, (H. W. Nash.)
10. Clisiocampa californica, Pack., abundant near West Cliff, larvæ on Ribes aureum, Pursh and willow. Rosita, (Nash.)
11. Samia gloveri, Strecker, near Ula, (T. D. A. C.) Rosita, (Nash.)
12. Halisidota maculata, Harris, near Swift Creek.
13. Antaplaga dimidiata, grote, near Swift Creek.
14. Sesia, n. sp. This has been turned over to Mr Hy. Edwards for description
15. Agrotis clandestina, Harris, near Swift Creek.
16. Agrotis saucia, Hb., not rare.
17. Agrotis auxiliaris, grote, very abundant in houses, etc.
18. Argotis auxiliaris var. introferens, grote, with the type.
19. Ufeus satyricus, grote, abundant in houses during the colder months.
20. Calocampa cineritia, grote, not uncommon in the spring.
21. Plusia brassicœ, Riley, not rare, larva on cabbage.
22. Heliothis armigera, Hubn, frequent.
23. Heliothis armigera, var. umbrosa, grote, more rare.
24. Caradrina civica, grote, West Cliff.
25. Anthœcia tumida, grote near Swift Creek.
26. Drasteria erechtea, Cramer. not rare.
27. Metrocampa margaritata var. perlata, guen., not rare. This is considered to be quite the same as the European margaritata by Mr. I. W. Tutt, to whom I sent an example so the name perlata will probably have to be entirely dropped.
28. Tetracis angulifera, one specimen, named by Mr. H. Edwards.
29. Aplodes junctolinearia, graef, near Swift Creek.
30. Cidaria populata, L., near Swift Creek, rather common.
31. Larentia cœsiata, L., near short Creek, one, expanse thiry-five and one half mill.
32. Cabera variolaria, guen., near Swift Creek.
33. Cabera erythemaria, guen., near Swift Creek.
34. Eupithecia miserulata, grote, one specimen.
35. Bleptina caradrinalis, guen., var. not common.
36. Homopyralis ducalis, one specimen.
37. Botys insequalis, guen., near Swift Creek.
38. Botys plumbofascialis, Short Creek, named by Rev. G. D. Hulst.
39. Eurycreon cereralis, Zell., extremely abundant

40. Eurycreon chortalis grote, not so common.

41. Crambus luteolellus var. ulœ. Ckll; the type of C. ulœ was sent to Prof. Fernald, who referred it to luteolellus. I have not had access to the description of C. luteolellus, but Prof. Fernald gives duplicatus, grote and zeellus, Fernald, as synonyms also, and so far as one can tell from the entirely insufficient descriptions published of these they differ from C. ulœ. I have therefore compromised matters by quoting ulœ as a variety.

42. Crambus sericinellus, Zeller, near Swift Creek.

43. Alucita hexadactyla, L., very common.

44. Lophoderus persicana, near Short Creek.

45. Carpocapsa pomonella, L., larva in an imported apple at West Cliff.

46. Psecadia semilugens, Zell., common.

47 Psecadia dicostrigella var. subcœrulea, Walsm, near Short Creek.

48. Laverna definitella, Zell., near Swift Creek.

II—DIPTERA.

The following list is, of course, the merest fraction of what is to be found, but the difficulty of naming Diptera has hindered the preparation of any list worthy of the name. We hope to take the matter up to better purpose sometime in the future. For identifications of Diptera we are indebted to Prof. C. V. Riley and Mr. L. O. Howard.

1. Cecidomyia salicis-strobilöides, O. S., galls abundant on willow at West Cliff, many Hymenoptera as well as cecids reared from them.

2. Cecidomyia bigeloviæ, n. sp., a small species, about four mill. expanse, reared from wooly Trypetid galls on Bigelovia. Probably undescribed, but description deferred until further comparisons with described species have been made.

3. Lucilia cæsar, L., not very common.

4. Musca domestica, L., very abundant.

5. Scriptotricha culta, common, breeds in flower-heads of thistles.

6. Melanostoma cœrulescens, Williston, near Swift Creek.

7. Eristalis hirtus, Loew, near Swift creek.

8. Microdon globosus, a fly, presumed to be this, bred from pupa found in nest of Formica integra, nyl., at West Cliff.

9. Dejeania vexatrix, O. S., one specimen.

10. Gonia frontosa var. ater, Ckll., thorax and abdomen almost entirely black; near Swift Creek.

11. Gonia exul. Williston, West Cliff.

T. D. A. Cockerell.

ANALYSIS OF WATER FROM BUCKMAN'S SPRINGS.

In 1879 the editor of the SCIENTIST first visited the canyon where are found the delightful mineral springs, well known in San Diego county as Buckman's soda springs, situated some ten miles north of Campo and fifty miles east of San Diego.

During a two weeks pleasure trip in July we again visited this resort and were favored by our friend, the proprietor, with the following analysis of the water from one of the many springs, which analysis was made by Mr. George E. Colby at the University of California, and was endorsed as correct by E. W. Hilgard.

"The water is only very slightly turbid and tastes strongly pungent from the presence of free carbonic acid gas, of which it contains 418.2 cu. in. per gallon, keeping in solution the substances marked with an asterisk (*).

"On evaporation the water yields a solid residue at the rate of 119.33 gains per gallon; of this amount 11.80 grains is chemically combined water, with a very small quantity of organic matter, which is driven off by ignition, leaving 107.53 grains of strictly mineral matter, of which 62.38 grains was again soluble in water, 45.15 grains being insoluble.

"The composition of the residue is as follows:—

	Grains per Gallon
*Silica	7.17
Potassium chloride	3.52
Sodium chloride	51.43
Calcium sulphate	8.26
*Calcium carbonate	31.65
*Magnesium carbonate	4.63
*Carbonate of iron	.87
Chemically combined water and organic matter	11.80
Total	119.33

(Signed) GEO. E. COLBY."

Physicians unhesitatingly recommend the use of this water, and it has often proved very beneficial in cases arising from impure blood and debility. As a pleasure and health resort these springs are destined to become widely and favorably known.

TO WORKING ENTOMOLOGISTS.

Mosquitoes and house flies are perhaps the most numerous, widely distributed and persistent of the creatures that attack the health and comfort of human beings. Of their attacks upon our comfort every one is aware. Scientific investigation favors the belief that tuberculosis and ophthalmia are carried from deseased persons to healthy ones by the house fly, and German experi-

menters have shown that serious blood maladies may be transmitted by the mosquito.

Certainly, therefore, any suggestion however remote, of a means of decreasing the numbers of or exterminating these pests should be followed with all possible skill and patience.

I have observed dragon flies gathering in scores around my camp in Minnesota to feed on the mosquitoes. I recently saw a dragon fly that had devoured over thirty house flies still voracious for more. Entomologists have observed the larvæ of the dragon fly swallowing undeveloped mosquitoes in large numbers.

Now may we not have in the active, voracious, harmless "mosquito-hawk," an agency for greatly diminishing the numbers of the smaller insects?

Professor Baird's success in producing millions of healthy fish in a few laboratory boxes and jars, the propagation of silkworms by scores of millions from eggs carried half around the world to Italy, the success of the plan for breeding foreign humble-bees in Australasia to fertilize the red clover,—these and many other similar facts seem to show that scientific methods have reached a stage where it is reasonable to hope that a plan may be devised whereby whole tribes of noxious insects may be exterminated by the artificial multiplication of their innoxious enemies.

For the purpose of drawing the attention of entomologists to the subject mentioned, I have placed in the hands of Morris K. Jesup, Esq., President of the American Museum of Natural History, New York city, $200, to be paid by him in three prizes of $150, $30, and $20, for the three best essays based on original observations and experiments on the destruction of mosquitoes and flies by other insects.

The following suggestions are made as to the direction in which the investigation should be carried and the essay formulated.

1. Observations and experiments upon various insects that destroy mosquitoes and house flies, stating the method of and capacity for destruction.

2. Observations and experiments to determine the best dragon flies to be artificially multiplied for the two above named objects—probably species of Aeschna, Libellula, or Diplax.

3. Give detailed statements of the habits and life history of the species chosen, based on original and careful experiments and observations.

4. Suggest a plan for breeding the insects in large numbers with a sketch of apparatus, and estimated cost of producing them per thousand.

5. Formulate a plan for using the insects in the larva, pupa, or perfect state for the destruction of mosquitoes and flies, (*a*) in houses, (*b*) in cities, (*c*) in neighborhoods.

In awarding the prizes clearness of statement obtained by accompanying sketches and new and purely scientific facts in the

life history of the Libellulidæ of which so little is known, will be duly considered.

All the essays received may be published wholly or in part at the discretion of the judges, and full credit will in all cases be given to each observer.

The essays should be forwarded by December 1, 1889, to Mr. J. H. Winser, at the American Museum of Natural History 77th street and 8th Avenue, New York to whom all communications should be addressed.

Robert H. Lamborn.

THE HUMMING BIRDS OF THE PACIFIC COAST NORTH OF CAPE ST. LUCAS.

Your correspondent asks, among other questions, how many species of humming birds there are in California. Six species occur in and west of the Sierra Nevada mountains and their southern extensions besides which, one if not two stragglers have been captured in this district, and three or four Mexican species are likely to be found, occasionally at least, in the Colorado Desert, as they have already been taken in Southern Arizona. The single eastern species, T. colubris, has not been taken on the Pacific Coast. A single example of T. floressii (Loddiges) was taken near Oakland by Mr. W. E. Bryant.

The known distribution of the six species is as follows:

1. TROCHILLUS ALEXANDRI. Black-chinned humming bird. Pacific Coast region from California east to Utah and Arizona, and southward.

2. TROCHILLUS COSTÆ. Costæ humming bird. Southern California, Arizona and Western Mexico.

3. T. ANNÆ. Anna's humming bird. California, Southern Arizona and Mexico.

4. T. RUFUS. Rufous humming bird. Rocky Mountains to the Pacific, north to Sitka, south to Mexico.

5. T. ALLENI. Allens humming bird. Pacific Coast north to British Columbia, east to Southern Arizona.

6. T. CALLIOPE. Calliope humming bird. Mountains of the Pacific Slope from British Columbia, south to Lower California, and east to Montana, Nevada and New Mexico.

With the exception of T. annæ, all the above leave California in the fall or early winter and go southward. T. costæ, however, is the only one of them that I found as far south as La Paz in winter, at which time it is abundant in the cape region. Xantus' humming bird, a beautiful species so far collected only in the peninsula between La Paz and Cape St. Lucas, may yet be discovered in summer in the mountains of San Diego county. It is a mountain loving species, usually found near fresh water.

T. alexandri breeds, on this coast, from San Diego county, or farther south, to British Columbia; T. costœ from Cape St. Lucas to San Bernardino county, perhaps as far north as Santa Barbara.

T. annœ breeds mostly in the agricultural districts of California. I have found both sexes in Butte county in December, and occasionally in the foot hills of Central California in all months of winter. My most southern Lower California record for this species is Cerros Island. T. rufus is mostly a mountain and northern breeding species. It probably breeds in the coast range as far south as Santa Cruz and still farther south in the Sierra Nevadas. It is rather rare in the high Sierras in latitude 38°, in breeding time, but is then abundant in some localities about a degree of latitude farther north.

T. Alleni was named by Mr. Henshaw in honor of Mr. C. A. Allen of Nicasio, Marin county, in 1877. It much resembles T. rufus and was treated as such previous to 1887 and is with difficulty distinguished from it in the field. I collected both sexes of T. alleni at San Diego in the spring of 1884 soon after I noticed the arrival of T. rufus, the latter having been first seen on March 10, and about the same time I saw fresh specimens in the possession of Mr. Carl H. Danielson of San Diego. Mr. Skirm says it is a rare summer resident at Santa Cruz, and I do not know that it breeds south of that place.

According to Mr. F. Stephens a few individuals of T. calliope breed as far south as the pine region of the San Bernardino mountains. It is moderately common in the fir forest of Calaveras county in the breeding season and very common during this time in the high Sierras of Butte and Plumas counties. A few individuals migrate through the low parts of California, but it appears to breed only in the mountainous parts of this State and northward. From the foregoing it will be seen that the nest found near Pasadena was probably the nest of T. alexandri, T. costœ or T. annœ, but without the parent positive identification is impossible. A nest and eggs without its owner may be a thing of beauty but usually it has no scientific value.

August 1, 1889. *L. Belding.*

NOTES AND COMMENTS ON THE DISTRIBUTION OF PLANORBIS (HELISOMA) BICARINATUS, SAY.

This well-known pond-snail first detected on the west coast of North America at Portland, Oregon, by Mr. Henry Hemphill, must also be credited to another west coast locality, namely to the region about the mouth of the Yaqui river near Guaymas, on the easterly side of the Gulf of California, about fourteen hundred miles south of the first named place where it was collected a few

years ago by Dr. Edward Palmer (U. S. Nat. Mus. 53,677). The National Museum series of this species is an interesting exhibit of the geographical distribution of this, for a Planorbis, well-marked form, as may be seen by the following:

Without making a list of the several States, Territories or localities represented by and included in the museum series and attested by numerous specimens, a simple geographical outline will be indicated by the exterior points herein named. Commencing at Cape Elizabeth, Maine, thence westerly, through Lake Simcoe Canada, thence to Manitoba[1] and Winnipeg[2] lakes, still westerly to Portland,[3] Oregon; thence southerly to the Yaqui river near Guaymas, Mexico, thence easterly through Kansas, Alabama and Georgia, nearly to the Atlantic sea-board by the way of Virginia, the District of Columbia, Pennsylvania, New York and Massachusetts to the point first mentioned, Maine!

Its occurrence at a point so far to the west as Portland, Oregon, where Hemphill found it and the extreme southwesterly point on the easterly shore of the Gulf of California (Yaqui river), the Palmer locality, may be regarded as phenominal. It will now be in order for parties who are inclined to make species, apparently upon no other ground than the fact of the remoteness of specimens in hand from the source or habitat of specimens already named or as species already described, to halt a little and lend a hand to the more useful and higher work of seeking by further researches and the accumulation of further geographical data to solve the interesting and fundamental problems included in the general term, *the distribution of species*. It would be well to observe the substantial hints offered by the Hemphill and Palmer locality to collectors to diligently seek whenever opportunity occurs for other localities within the territory indicated by these extreme outposts of its specific area. In the central region the National Museum contains specimens from Ft. Stevenson, Dakota and the Yellowstone Park. Its distribution to the eastward of these is pretty general and reasonably well known, but between these interior localities and the west coast, a glance at the map will more clearly impress the reader, as it will give a definite idea of the vast extent, of the enormous area that offers an ample reward to the field worker not only as to this species, but who can say as to how many others.

Not many years ago without doubt, these west coast specimens would have been honored with a specific title, for the matter of distribution was seldom considered. The great high-way furnished by the Colorado of the West, the extensive drainage system of which said river is the main channel includes no doubt within its northerly limits the source or scources from which the colony detected by Dr. Palmer, the first settlers we may call them migrated. Not one by one grand leap or by a single and direct

1—Collected by Miller Christy; 2—teste Bell; 3—H. Hemphill.

movement, but step by step, gaining one year and losing the next,but gradually through centuries extending the area of its territory until this extreme southerly and westerly outpost was reached. The same force which in its torrential fury carved the great cañons in the past, at times in milder moods, assisted by its distributing current to the extention of the territory of an insignificant form of animal life. So too with the colony found by Hemphill at Portland, Oregon. Follow the course of the Columbia on the map, trace its meanderings and note the remoter confluents that combine to make the greater stream and the extent of the drainage system and the area drained thereby. The same suggestion to the student of geographical distribution presents itself and affords a reasonable clue by means of which similar phenomena are explainable.

Robert E. C. Stearns.

U. S. National Museum.
Washington, July 29, 1889.

BRIEFER ARTICLES.

(From Demorest's Monthly Magazine.)

A Moving Lake of Ice.—The Muir glacier, so named after Professor John Muir, the noted geologist who has described it most satisfactorily, is the most wonderful of the glaciers in southeastern Alaska. It is forty miles long, and is moving at the rate of sixty feet a day through the basin of the mountains. The greater portion of this crystal river, about an eighth of a mile wide, is billowed into rounded hills and beetling precipices, quite resembling the sea in a storm; and at the centre it is splintered into turrets and pinnacles of amethist, turquoise and sapphire tinted ice with spires of dead-white crystal. All its surface is riven by countless crevasses, in the bottom of which streams of clear water find their way. These chasms are frightful gaps to anyone looking down between their walls. From this moving lake of ice, bearing rocks and long lines of detritus on its surface, vast masses break away as it emerges from a narrow gateway of mountains into the open bay. These icebergs fall off from the huge glacier and dash into the waters, making navigation perilous to craft of all kinds, even when miles away. Among the detritus frozen amid the ice masses, are veins of porphyry, jasper, chalcedony, and quartz;and blocks of finest marble, granite, and basalt are strewn upon the surface of the icebergs and the frozen lake in which they find their source. The traveler or explorer amid Arctic snows finds something appalling in the frozen wonders of our contradictory planet.

The Sorghum Industry.—The results of ten years of experiment and investigation by the Agricultural Department at Washington on the cultivation and manufacture of sorghum and

its products, do not appear to encourage the prosecution of the industry as an independent branch of business. According to recently published reports on the subject, it has been ascertained that the cultivation of the plant for sugar and syrup does not pay. The cost of machinery and the difficulty of obtaining that which is especially suited for the purpose, the high cost of skilled labor required for the success of all departments of the work, and the difficulty of finding a market for the necessarily crude product, are likely to prove obstacles that the ordinary farmer will not readily overcome. Kansas, which is one of the leading States in sorghum raising, reports for last year a yield of about ten tons per acre, for which growers received ten dollars per ton delivered at the factories. This gives but a small margin of profits; indeed, none at all, if labor must be hired. Experts are, however, of the opinion that there is a future for sorghum, and that with new and improved machinery its culture may be made profitable.

Desiccation of the Dead.—A unique plan for the disposition of the dead, with reference to the preservation of evidence in capital criminal cases, was recently laid before the Medico-Legal Convention. This system consists of a scientific process of desiccation by which the tissues are deprived of moisture and kept in a state of complete preservation, and in a condition which renders a critical examination and a chemical analysis of them at any time a simple and easy matter. The bodies are to be laid away in sepulchers arranged in tiers and rows in a great mausoleum, with more or less privacy, according to cost, each body to be perfectly accessible at all times. The sepulchers will each have one opening for admitting the body. In this there will be a plate-glass door, and, outside, a marble or metal door for safety. When the outer door is open the body may be seen, without discoloration or decay, but of course exceedingly emaciated. The preservation of the body is affected by means of a current of dry air passing through conduits formed in the concrete of which the sepulchers are composed, which bring the dry air into the sepulcher at one end, while at the other the air-current passes out laden with gases and moistures of the body which are carried to a furnace and consumed, so that no deleterious gases or offensive odors can escape to the outer air. A moderate current of such dry air accomplishes the desired purpose in about ninety days. After the work is finished, the conduits are hermetically closed; oxidization and decomposition are prevented, and the body remains in view through the glass door. This mode of disposing of the dead avoids all the unpleasant features of earth burial and its attendant unsanitary evils through poisioning the earth and water and storing disease germs to break out in future epidemics. The Mausoleum System, as the projectors call it, meets all the objections which cremationists urge against burial, and also meets the objections to cremation, by the preserva-

tion of the body, avoiding the shock to the sensibilities which revolt at the thought of the destruction by fire of the remains of loved ones. Other advantages of this new process are that it will prevent premature interments, and secure the body from theft.

THE CLIFF-DWELLERS.—The cliff or cave-dwellers, reported extinct by the Smithsonian Institution, have been discovered by thousands in Northern Mexico, by Lieutenant Schwatka, in charge of America's expedition into Mexico. In exploring the wild regions of the Sierra Madre Mountains, living clift-dwellers were found in abundance, wild and timid, and flying at the white man's approach. Their habitations are precisely similar to the old, abandoned cliff-dwellings of Arizona and New Mexico, whose inhabitants were supposed by archæologists to antidate the mound-builders, and to be quite extinct. But Lieutenant Schwatka's discovery makes it clear that these are probably descendants of the ancient cliff-dwellers, who were driven from their more northern habitations, and retired to Southwestern Chihuahua, where they have been living for centuries, undisturbed, following the primitive habits and customs of their ancestors, about whom there has been so much speculation Schwatka, therefore, gives to the world the first information relating to these curious people, and is about to set out on an expedition to follow up his discoveries and investigate them more thoroughly. He estimates that the cave and cliff-dwellers number from three to twelve thousand; and they are armed only with bows, arrows, and stone hatchets. They are tall, lean, and well-formed, with blackish-red skins, nearer the color of the negro than the American Indian. They are sun-worshippers, and practice several forms of devotion to that luminary.

ANOTHER MAMMOTH CAVE.—An exploring party attracted by the reports of a discovery made by a farmer in Wyandot County, Ohio, of a mysterious hole in Limestone Ridge, visited the place and made a descent to find out what was at the bottom of the story and the hole. The place proved to be an immense cavern, sixty feet in width at the landing the party made, they having gone down by rope 100 feet through a hole varying in diameter from three to thirty feet, through limestone rock. The ceiling rose like a dome to a height of at least fifty feet. Exploring the recesses of the cave, the party suddenly emerged into another mammoth chamber, apparently much larger than the first, and, like it, set with numerous stalactites and stalagmites of beautiful formation and marble-like whiteness, sparkling brilliantly in the light of the Roman candles fired into space by the visitors. At a long distance from the entrance they came upon a lake of pure, crystal clear, cold water, of unfathomable depth.

TO BREAK UP THE SLAVE-TRADE.—About $4,150,000 have

been subscribed to build a railroad in Africa, between the lower falls of the Congo river and Stanley pool. The project of building this road, which will cover the distance of 262 miles, was formed by the King of the Belgians, whose interest in African exploration and in the abolition of the slave-trade in Africa is known throughout the world. He found a warm ally in Mr. McKinnon, the great Scotch ship-owner, an immensely wealthy man—said to be the largest individual ship-owner in the world—and another in Mr. Collis P. Huntington. This scheme is said to be actuated more by sentiment than by motives of gain, for the projectors believe that only by such means as opening up the Congo to travel can the fearful traffic in slaves be obliterated.

Uncertainty of "Electrocution."—The prophetic utterance of Professor Brackett, of Princeton College, in his address to the Electrical Club of New York last fall: "Notwithstanding the fact that in New York it is the law that all persons convicted of offenses that are punishable by death are hereafter to be executed by electricity, my belief is that never a single man will die, except by accident, by that method," seems likely to be verified. All the electricians of New York are asking to have the new execution law declared unconstitutional. The legality of the sentence passed upon the murderer William Kemmler, who was to have been the first executed by electricity, has been disputed on the ground that the punishment is cruel. Evidence will be taken before a referee, and persons interested in electricity are now eagerly awaiting the result of the case and the evidence taken.

PROCEEDINGS OF SCIENIFIC SOCIETIES.

(San Francisco Microscopical Society, July 10, 1889.)

The semi-monthly meeting of the San Francisco Microscopical Society was held at its rooms 120 Sutter street, last evening. Vice-President Breckenfeld presided and spoke very feelingly of the death of F. L. Howard, one of the old time members, and offered the following resolutions, which were unanimously adopted:

Whereas, Our late esteemed friend and fellow-member, F. L. Howard, has been called from earth by the final summons, and we who have been associated with him in the San Francisco Microscopical Society are desirous of placing on record some fitting expression of the high regard in which we held him and of the sorrow we feel at his loss; be it

Resolved, That in the death of Mr. Howard this society is called upon to mourn the loss of one who, for many years, has been untiring in his devotion to its work and his interest in its welfare,

and who endeared himself to its members by his quiet enthusiasm in microscopical research and by his genial and kindly disposition.

Resolved, That these resolutions be spread upon the minutes of the society and a copy conveyed to his bereaved consort, with the assurance of our warmest sympathy and most sincere condolence. *C. P. Bates, Recording Secretary.*

SANTA BARBARA SOCIETY OF NATURAL HISTORY.—July 26, 1889, Dr. L. G. Yates was elected corresponding secretary. Dr. Yates gave notice of the presentation for reading of papers on the ancient history of Mexico and Central America. Selections were read by several members on the discovery of Rafflesia Schadenbergia in the Philippine Islands; on the discovery of the nest and eggs of a rare bird, by Mr. Bryant in Lower California; on Mastodon gigantea, which Dr. Yates stated had been found more frequently in the foothills of the Sierra Nevadas in central California than in other localities; and on the edible fruit of the Opuntia (from the WEST AMERICAN SCIENTIST) followed by discussions. News from Mr. Clark Streator, now collecting in British Columbia for the American Museum of Natural History was reported; *Mrs E. Beckman, Secretary*

BIBLIOGRAPHY.

THE STORY OF CREATION. A plain account of evolution by Edward Clodd. F.R.A.S. Illustrated. The Humboldt Publishing Co., 28 Lafayette Place, New York. Writing of this book a celebrated London critic says: "Surely the asounding history of the evolution of the visible universe has never been told more popularly perspicuously and pleasantly than in this volume," an opinion in which we entirely concur. Those of our readers who have neither the time nor the courage to read the more voluminous works on the subject of evolution will be much pleased with the concise and vigorous account given in this latest work by Mr. Clodd. There are over eighty illustrations, tables etc., and taken, all in all, we predict for it the largest sale of any book in a library already famous for its excellent list of subjects and low prices. It is No. 110 of the Humboldt Library, Price, 30 cents.

THE PLEASURES OF LIFE. Part 2. By Sir John Lubbock, Bart. This is No. 111 of the Humboldt Library, No. 97 of the same Library being Part 1. The author divides his subject into thirteen sections of which the titles are: Ambition, Wealth, Health, Love, Art, Poetry, Music, The Beauties of Nature, The Troubles of Life, Labor and Rest, Religion, The Hope of Progress and The Destiny of Man. Such of our readers as got the first number will be sure to get the second and those who did not should order both. Price, 15 cents each.

ORANGE CULTURE. Some facts relating to orange culture in Southern California, consisting of statements of experienced

orange growers obtained by personal interviews, has just been issued by Scipio Craig for the Redlands (Cal.) Orange Grove and Water Co. It is well worthy of a perusal at the hands of would-be-growers.

Historical Society of Southern California.—Annual publication of 1888-9. This issue is truly a historical pamphlet (fifty-five pages) containing no contributions to natural science, but of interest to the student of our State history, as it treats of some of the earlier political movements.

John Hamilton. Catalogue of the Coleoptera common to North America, Northern Asia and Europe, with distribution and bibliography. (Philadelphia, 1889; reprinted from Trans. Amer. Ent. Soc.) This valuable catalogue, enumerating as many as 484 species of Coleoptera common to the northern regions of both hemispheres will be of great assistance to all students of geographical distribution.

The general conclusions to which the author is led by the abundant facts thus marshaled in orderly array are "that Europe and America were formerly as widely separated by water as they now are; that eastern and western North America were divided by water centrally (the north-eastern part probably submerged in whole or in part); that the area now occupied by Behring sea from Kamschakta to Alaska and far west of the Aleutian Islands was land and possessed a more temperate climate than at present." For he says "The large number of native species in common and the intimate relation between the Coleoptera of North-western America and North-eastern Asia is brought out very prominently, while on the other hand the paucity of native common species on both the Atlantic Coasts is as plainly presented." This view, although contrary to that of many authors, is not new and is supported by many facts in distribution other than those presented by the Coleoptera.

Among ferns we have Pteris serrulata common to North America and China—but on the other hand what is to be said of Woodwardia radicans occurring at San Diego, Cal., and in Madeira? Among fishes the remarkable resemblance between the sturgeon of Asia and America (of the genera Scaphirhynchus and Polyodon) has been pointed out; of Phœnogamic plants, Fragaria vesca, although common to North America and Europe is found also in Japan, while W. O. Focke states that South Chinese and North Indian types of the genus Rubus occur in Mexico and Peru. These are only a few instances—many others of like nature might be given. Indeed, in an article on Cervus luchdorfi, the Asiatic representative of our wapiti, printed in "Nature" in 1881 we read that "Taken in connection with other similar phenomena which have lately come to light, it tends to show very evidently that north America owes its many resemblances to the Palœarctic fauna, not to any former land connection between Europe and North America, as was formerly supposed

by the advocates of the fabulous "Atlantis," but to a bygone extension of land between East Asia and West America.

Taking Dr. Hamilton's catalogue more in detail, we notice the general resemblance of the list to the whole Coleopterous fauna of an oceanic island. The Staphylinidoe are remarkably numerous, and the Carabidœ very well represented, but the Curculionidœ and Chrysomelidœ are much less numerous than might have been expected. Additional localities might be given for many of the species, as for instance, the present writer has taken the folfowing species in Colorado which are not recorded from that State in the catalogue; Necrophorus vespilloides, Dermestes lardarius var. signatus, Meligethes brassicœ, Chalcophora virginiensis, Eros aurora, Aphodius granarius, A. lividus and Hylotrupes bajulus. It seems almost impossible that such species as Aphodius granarius, A. lividus and Hylotrupes bajulus can have been imported into America by human agency as suggested in the catalogue. Many species were supposed to have been imported by the older authors who imagined that quite identical forms did not occur naturally in both hemispheres, but the evidence of importation is often quite wanting. In certain cases the fact of a common eastern species not having yet crossed the great plains east of the Rockies, is strongly in favor of the view that its advent into America was a recent one (taken in conjunction with its occurrence in Europe), but in the present instances this is not the case. *T. D. A. C.*

EDITORIAL.

From June to September the residents of Southern California almost unanimously decide that they "need a change of air," and all who can, spend from one to eight weeks away from their city or suburban homes, indulging themselves in the luxury of camping out in the woods. Some choose one locality, some another, but all seek more or less isolation though rarely with success. Such gay parties of old and young are usually equipped with a multitude of "necessities" which often prove more troublesome than useful. The editor formed one of these annual parties and can speak from a long experience of similar excursions, and we are tempted to parody some well-known lines after this fashion:

> The woods were full of campers out,
> And maidens red as deer,

but two lines is considered sufficient of this style of literature. One young lady was found so wicked as to repeat something like the following:

> "Teachers to right of them,
> Teachers to left of them,
> Teachers in front of them,
> Ordered and hungered," etc.,

but we don't care to remind her that we overheard these classic lines.

The daily paper recently noted a remarkable curiosity found in the vicinity of San Diego, which, it was announced, was to enrich the U. S. National Museum. It was nothing less interesting than a *red* bat, whose bite is reputed to be invariably fatal. A friend of the editor carefully examined this specimen, and gave us an accurate description, which we are pleased to furnish our readers in advance of any of our scientific contemporaries. (Diagnosis: a brick-bat.)

"Ere this reaches our readers we expect we shall have welcomed many prominent eastern scientists who have notified us of their intending visits to our coast. Dr. George Vasey, botanist of the Department of Agriculture, Major J. W. Powell, and others connected with the scientific work at Washington are among the number. We feel greatly encouraged at the present indications of an increase in interest and activity in scientific subjects in the west.

NOTES AND NEWS.

T. V. Munson of Denison, Texas, special agent of the U. S. Department of Agriculture and C L. Hopkins assistant pomologist of the Department visited San Diego about August 1st, for the purpose of investigating the wild grapes and other native fruits and nuts of this section. The results will be published in a special report for free distribution by the Department.

Queen & Co., of Philadelphia have issued a new catalogue of their clearance sale of microscopes, objectives, etc.—A chance to obtain an outfit or accessories and sundries at low cost.

The cotton tree (Rhus cotinoides) is said to "kill other trees and to then commit suicide,"—hence the planting of this tree is not recommended.

Dr. C. C. Parry has returned to his home in Davenport, Iowa, much to the regret of his California friends.

A genuine midsummer number is *The Century* for August, with its opening article on "The Stream of Pleasure—the River Thames" by the Pennells,—husband and wife. Vacationists will find matter of interest in Dr. Weir Mitchell's profusely illustrated article on "The Poison of Serpents"—a line of inquiry in which he has made important discoveries. Remington, artist and writer, describes with pen and pencil his outing with the Cheyennes; and a group of well-known wood-engravers describe with drawings and engravings by each, a wood-engraver's camp on the Connecticut River, as well as the methods of the American school of wood-engraving.

Dr. Dight, who is Professor of Anatomy in the American College of Beirut, Syria, has made a careful comparison of a collect-

ion of human skulls which are stored away in an old monastary in the Kedron Valley midway between Jerusalem and the Dead Sea, with skulls of the same race at the present day. The measurements show some significant differences. The Caucasian skull has, during the past thirteen centuries, increased in circumference nearly two inches, and has gained in cranial capacity three and one-half inches. There has been no increase in width. The brain has gained in height and length—*i. e.*, there has been a development of the upper and anterior parts of the brain, the parts which we should expect to increase by education and civilization as they preside over the moral and intellectual functions. The lower portions of the brain, in which the lower or more selfish propensities are centered, and which give breadth to the head, have, in the march of the centuries, failed to grow as rapidly as the higher brain centers, hence the non-increase in the width of our skulls.

Professor Palmieri anounces from the Vesuvian observatory that the eruptive cone of Vesuvius has fallen into its very depths, and that at the same time a copious stream of lava has issued form the north-east and has already arrived at the foot of the great cone. About the same time the volcanic mountain of Lipari made an extraordinary display. From the crater of the mountain smoke issued mixed with ashes,which was changed into very fine rain over the whole of the Æolian Islands. The air was thick and unbreathable; all the horizon was obscured by the blackest clouds and by ashes. The Grotto della Signora, to the west of Lipari, which has defied the ruin of centuries, is now destroyed. It appears that the volcano by its frequent shocks has completed the work of demolition.

According to the *Indian Mail*, the Madras Museum now possesses the skeleton of the largest elephant ever killed in India. This elephant was the source of great terror to the inhabitants of South Arcot, by whom it was killed and buried. The museum authorities dispatched a taxidermist to the spot to exhume the bones and transfer them to Madras. The skeleton is exactly ten feet six inches in height, being eight inches higher than the highest hitherto measured.

The Swedish government has decided to send a man-of-war to New York to take home the body of Captain Ericsson, who expressed a strong desire to be buried at Langbanshyttan, in Vermeland, the place of his birth. In his will no directions are given as to the disposal of his valuable collection of models, but Swedish journals state that the executors will present them to the Smithsonian Institution.

Dr. Eigenmann has succeeded in hatching fish eggs in thirteen hours—seven hours quicker than previous records.

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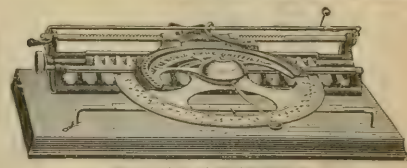

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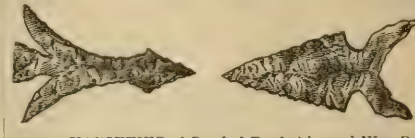

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